

Computer System Uptake and Use On New Zealand Farms

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**COMPUTER SYSTEM UPTAKE AND USE
ON NEW ZEALAND FARMS**

- 1998 AND 1993 COMPARISONS -

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Summary

A national postal survey of 3,021 randomly selected primary producers was conducted over late 1997 - early 1998 to investigate the penetration of “on-farm” computers and clarify details of their use.

The sample was stratified by geographical location, farm type and physical area. The response rate (49.5%) was exceptional with 1,437 valid replies being received by the mid-April 1998 cut-off date.

For other than farms less than 75 hectares the responding sample was very similar to the total population. Computer penetration has now reached 42.72% of the sample compared with 6% in 1986 and 24.40% in 1993. The “computer farms” tend to be larger than non-computer farms, the managers tend to have higher levels of formal education, they tend to be younger, and they tend to be involved in more off-farm businesses. The main reasons for not owning a computer include “no use to me”, “too expensive”, “not economic” and “couldn’t learn to use”. From ownership/intended ownership details it appears the uptake rate is probably at a maximum now. By far the majority of computers are “IBM compatible”. Computer use is around 20 hours per month with word processing, financial recording and analysis as well as financial budgeting continuing to be the important uses. The farm manager and his or her spouse are the main business use operators (78.5%). Most users (89%) believe a computer is an economic investment. Of increasing importance is the use of the Internet with some 3 hours/month spent on Internet access and communication. Currently 28% of computer users have a connection, but a further 40% indicate they will connect in the next two years. E-mail is the main use of the Internet but “entertainment and fun” as well as technical information gathering are important uses. Some 47% believe the Internet is valuable or better with 37% still being neutral or undecided. Users await further developments.

Generally, there are few differences when the data is divided by farm type, suggesting most managers view a computer similarly for all production types.

Of major significance is the conclusion that computer owners and non-owners are not inherently different in their objectives. While further work on a wide range of variables is necessary, this suggests training programmes and software need not be markedly different for each sector.

1. Introduction

Micro-computers were first introduced around 1980. Compared to previous computers they were relatively inexpensive and had similar computing power. Yet they were not generally affordable relative to 1998 prices. At that time the farseeing who suggested these machines might be helpful to primary producers on an individual basis were not taken particularly seriously. Some farmers, however, did have vision and were persuaded to start exploring the use of computers, sometimes on a shared basis.

The logic used, of course, was that the data and information storage, computational and analytical, as well as retrieval attributes of computers made them ideal support equipment for decision-making and recording (and associated form filing). Thus, it was a matter of cost - once the cost declined sufficiently it was inevitable that farmers would take on these machines. And this they certainly did, and continue to do. Currently almost half of all primary producers have a computer. This is a remarkable uptake rate relative to earlier major innovations such as the internal combustion engine.

Initially farmers did not believe they would be able to use devices that had traditionally been associated with research establishments, the military and corporates with huge investments and specialist staff. The development of software designed for lay person use changed this, and while innovations are still occurring, and will continue, the currently available all important software, particularly for financial management, can be easily operated after a modicum of training.

It is eventually inevitable that businesses, both large and small, will not be able to operate without a computer. This is particularly the case in primary production where communication with banks, markets, and suppliers will be greatly enhanced despite the physical distances. The trend is to force production businesses to become computerised to remove the need for expensive and time-consuming people and paper-based transactions.

The computer has created a major shift in the technology of living which, if harnessed appropriately, will improve efficiency as well as further develop aspects of a desirable society. Thus, the crucial need to study its current impact so that future activity can be appropriately directed.

The survey reported here was designed to discover the extent of current computer use on New Zealand primary producing properties, to discover the details of methods of use and to discover the intentions of those that currently do not have a computer.

The sections that follow contain a description of the survey procedures, details of the sample relative to the population as a whole, information on computer ownership and the properties on which they are located, details of the computer users, details of the computers themselves, information on the functions they are used for, attitudes of the users to computing and the training and support they have received, details of Internet use, and, finally, a discussion on the nature of farmers relative to their objectives. This Internet information is being sought by many groups as they see this as a means to conduct business and communicate with primary producers.

A large national survey involves many costs and a major time input. The task, for example, of one posting of the survey schedule to over 3,000 recipients involves hours of collation, envelope filling, organising labels and so on. Many people have helped including summer scholarship students and secretaries. We gratefully acknowledge the help provided by all these people and also of the funders who made the study possible in the first place. The stamps for one posting alone (and three were involved) cost \$1,200 plus the freepost return envelope postage.

In particular, Craig Benbow was responsible for managing the survey procedure and for a considerable portion of the data entry and its collation. Helen Clarke provided data entry and secretarial support as well as hours of paper folding. Samantha Gurteen, Daniel Kelly, Judy Derby and Rachel Watson all helped with some of the physical tasks.

This study complements two earlier surveys and enables time trends to be assessed. This comparison is essential in assisting predictions. In 1990 (Nuthall, 1992) data from 639 computer users and 1,063 non-users was obtained. (These were all producers who received a newsletter for computer interested people; it was not a random sample).

In 1993 (Nuthall and Bishop-Hurley, 1994) data from a randomly selected sample was collected; 1,042 valid responses were obtained from 3,097 postings. References to this data is made in the report.

2. Survey Procedures and the Sample

A postal survey was chosen as most questions were simple with easily, for most producers, accessible data requirements. Furthermore, a postal survey meant the sample size could be increased relative to an interview survey. Another possibility was a telephone survey, but for the amount of data requested this approach was believed impractical.

Appendix One contains a copy of the questionnaire used. This was pre-tested on 24 farmers, some of whom were known to have a computer. After noting their comments and those of colleagues, the final version was prepared and distributed with a covering letter to 3,021 primary producers that had been randomly selected from selected strata. The sample size was largely dictated by the funds available. To increase the response rate, ten copies of the Lincoln University Budget Manual (both Technical and Financial) were offered to all those replying, the selection being based on a random draw. In the end, 1,437 valid responses were obtained though 1,553 schedules were returned by mid-April 1998. This 49.5% response is an excellent rate for a mail survey. The 1993 survey achieved 37.1% which was similar to most mail surveys (Novak & Stegelin, 1988).

The survey was first posted in late November 1997. A reminder letter was sent in early January 1998 (2,132 letters) and another copy of the questionnaire sent in mid-February 1998.

The sample was stratified according to land use, geographic area, and farm size (ha). The strata sizes were based on the population data as provided by Valuation New Zealand.

Tables 1, 2 and 3 below give the population data and the corresponding responding sample data.

Table 1
Farm Size Distribution
1.1 Size based on Area

Farm Size (ha)	Population %	Responding Sample %	Difference
25 to <50	9.17	13.78	+4.61
50 to <75	24.34	20.60	-3.74
75 to <100	14.44	14.06	-0.38
100 to <150	14.93	15.45	+0.52
150 to <200	8.96	8.77	-0.19
200 to <300	11.27	12.80	+1.53
300 to <400	5.33	5.15	-0.18
400 to <500	2.90	2.51	-0.39
500 to <750	3.56	2.64	-0.92
750 to <1000	1.48	1.18	-0.30
1000 +	3.62	3.06	-0.56

1.2 Size based on Stock Units

Percentage		
S.U.	1998 Survey *	1993 Survey +
≤ 1000	15.35	11.60
1001 to 2000	23.75	26.60
2001 to 3000	19.90	19.10
3001 to 4000	12.09	14.40
4001 to 5000	8.18	9.40
5001 to 6000	5.36	5.90
6001 to 7000	4.42	2.60
7001 to 8000	2.03	2.20
8001 to 9000	1.88	1.20
9001 to 10000	1.88	1.00
10001 to 11000	0.65	1.60
11001 to 12000	0.87	0.50
12001 to 13000	0.43	0.60
13001 to 14000	1.16	0.40
> 14000	2.05	2.9

+ The 1993 figures are based on SU conversions - sheep = 1.1, beef = 5.0, dairy cattle = 7.0, goats = 0.9, deer = 1.75, pigs = 2.5, horses = 7.0, crops = 15.0/ha, all 'other' = 6.0/ha.

* The 1998 figures are based on SU conversions - sheep = 1.0, beef = 5.0, dairy cattle = 7.0, goats = 1.0, deer = 1.8, pigs = 2.5, horses = 5.0, crops = 15.0/ha, all 'other' = 6.0/ha.

Table 2**Farm Type Distribution****2.1 Using Valuation NZ Definitions**

Land Use	Population %	Responding Sample %	Difference
Arable	4.84	4.20	-0.64
Dairy	29.44	30.76	+1.32
Horticulture	1.67	0.80	-0.87
Pastoral (store...)	7.08	6.69	-0.39
Pastoral (fattening...)	54.24	55.30	+1.06
Other (deer, pigs, poultry...)	2.73	2.20	-0.53

2.2 Using Divisions Based on Type of Stock Units *

	Percentage of Sample	
	1998	1993
Sheep	35.26	24.7
Beef	12.96	7.0
Dairy	32.30	37.1
Mixed stock/crop	7.19	10.0
Other (deer, goats, sheep & beef)	12.29	21.2

* (Based on $\geq 50\%$ Stock Units in each type, except for 'mixed' which is $\geq 20\%$ SU's in cash cropping (1 ha = 15 su))

Table 3
Regional Distribution of the Sample

Region	Population %	Responding Sample %	Difference
Northland	8.0	7.38	-0.62
Auckland	3.37	2.50	-0.87
Waikato	17.34	19.00	+1.66
Bay of Plenty	3.77	3.90	+0.13
Gisborne	2.09	1.67	-0.42
Hawkes Bay	4.80	4.88	+0.08
Taranaki	6.69	6.50	-0.19
Manawatu-Wanganui	12.17	11.60	-0.57
Wellington-Wairarapa	2.81	2.30	-0.51
Westland	2.06	2.02	-0.04
Marlborough-Canterbury	15.13	16.08	+0.95
Otago	8.89	9.39	+0.50
Southland	9.91	10.02	+0.11
Tasman	1.54	1.25	-0.29
Nelson	0.06	0.00	-0.06
Marlborough Sounds	1.34	1.25	-0.09

Other than for the farm sizes under 75 ha the sample is a remarkably good representation of the population in respect to area and types of farming as well as geographical location. Deciding on the minimum size to include is always a dilemma as many small sized holdings are not full time farming operations, but there are notable exceptions in horticulture, pigs and poultry units. It is expected many of the non-responding small holding owners do not produce significant quantities of primary product.

In comparing the farm sizes in terms of the stock units ‘carried’, the properties do not seem to have increased in size between 1993 and 1998. The numbers having less than 1000 su has increased, and the larger size proportions are similar or less. This is surprising given the trend to larger business units.

Based on the Stock Unit definition used (see Table 1) the farm type distribution between 1993 and 1998 (Table 2) indicates there is a bias towards sheep farming, away from dairying and ‘other’. It is likely, however, that the size of dairy units has increased so total cow numbers have probably increased despite the lower number of dairy farms.

3. Computer Ownership

As at mid-April 1998 42.72% of the sample had a computer. This compares with 6% in 1986 (Pryde and McCartin, 1987) and 24.40% in 1993 (Nuthall and Bishop-Hurley, 1994). In five years the increase has been 18.32% (3.66%/year) whereas in the previous seven years the increase was similar in total (18.4%, 2.63%/year). It is suspected the current rate will continue for some years.

Table 4 contains the details of the farms' enterprises. This data is not an average of all farms, but for those farms with each particular enterprise.

Table 4

Farm Details

(The starred rows are significantly different at 5% or greater.

The bracketed figure is the number responding)

	Computer Farms	Non-Computer Farms
Area (ha)*	717.6	438.8
Sheep (1/7/97)*	3612 (374)	2211 (507)
Cattle (1/7/97)*	476 (374)	239 (506)
Dairy Cattle (1/7/97)*	361 (277)	293 (327)
Deer (1/7/97)	572 (64)	317 (81)
Horticulture (ha)	29 (13)	169 (15)
Goats (1/7/97)	86 (29)	129 (45)
Pigs (1/7/97)	313 (29)	78 (37)
Poultry (1/7/97)	1827 (33)	17 (52)
Horses (1/7/97)	11 (121)	7 (164)
Other (ostrich, emu, llama...)	— (12)	— (16)
Forage and feed crops (ha)	22 (312)	30 (396)
Cereal and pulses (ha)	69 (90)	39 (111)
Small seeds (ha)	74 (33)	31 (27)
Process crops (peas, corn...)	43 (28)	17 (34)

The 'computer farms' are bigger in area, the sheep farms have more sheep and cattle, the dairy farms are larger in cow numbers, as are the deer holding units. This confirms the trend found in the 1993 survey in which 'computer farms' tended to be larger both physically and financially. Eventually this relationship must weaken.

The type of computer held has stayed much the same over the years. Currently 90% (76.5% in 1993) are IBM compatible, 3.87 are Apple Mackintosh, 4.2% (19.8% in 1993) are smaller machines (Atari, Amiga, Commodore...), and the remainder a range of other non-specified types.

4. Social Factors

It is important to be aware of relationships between non-physical factors and computer ownership as it helps predict future computer uptake and use, as well as indicate the kinds of difficulties that might need to be addressed.

Surprisingly, there appeared to be little difference between the stated objectives of computer and non-computer using property managers. Table 5 contains the average score given to each objective listed in the questionnaire on a 5 (very important) to 1 (not important) scale.

Table 5
Average Ranking of Managers' Objectives
(1 [not important] to 5 [very important] scale)

Objective	Computer Farms	Non-Computer Farms
To be the best farmer/producer	3.27	3.30
To be the most productive	3.61	3.54
To make as much money as possible	3.87	3.77
To enjoy farming	4.29	4.37
To provide an income to raise my family	4.23	4.22
To have a reasonable income and plenty of time to enjoy other interests.	3.86	3.95

None of the slight differences were statistically significant. It is clear enjoyment of farming and family issues are important.

The objectives can be grouped into three broad categories. The first two in Table 5 ('best farmer/producer' and 'most productive') might be called a 'production' orientation. A 'money' orientation can be obtained by grouping the 'make as much money as possible' and 'provide income to raise my family' objectives, and, finally, the 'enjoy farming' and 'reasonable income and plenty of time to enjoy other interests' can be grouped to form an 'enjoyment' orientation. Table 6 presents this grouped data for each farm type. All farmers seem to put an emphasis on 'enjoyment' over 'production', though 'money is also important.

Table 6**Objectives Relative to Farm Type *****Average Scores * on a 10 (very important) to 1 (not important) Scale**

Objective Orientation	Sheep	Beef	Dairy	Mixed	Other	Mean
Production +	7.06	6.58	6.71	7.12	6.89	6.87
Money ≠	8.11	7.60	8.07	8.23	8.04	8.03
Enjoyment	8.10	8.36	8.38	8.19	7.85	8.17

* See Table 5 for detailed definitions.

+ The differences were non-significant.

≠ The differences were highly significant for the simple 'money' objective ($\chi^2 = 92.52$, $p = 0.00$)

In contrast, the difference in the average age of the farmers was highly significant. The managers on 'computer farms' averaged 45.69 (43.29 in 1993) years while the others were 50.5 (45.65 in 1993) years - a difference of five years. This difference is more marked compared to the 1993 survey where the difference was only 3 - 4 years. Perhaps those that did not have a computer largely still have not purchased, but new younger farmers have tended to purchase.

Most farm computers are operated by more than one person - the main 'other user' has an average age of 31.15 years suggesting the younger generation is providing support.

Most computer using managers have similarly been farming for a smaller number of years (23.25 years) than their non-using counterparts (29.21 years). This difference is statistically highly significant.

There is also a clear difference in the formal education levels of the two groups. In presenting this data the computer users' information for both the 'main' and the 'other user' education levels are presented. See Table 7.

Table 7
Highest Formal Education Level
(Column Percentages)

Level	Computer Users			Non-Computer Farmers	
	Main User		Other User	1993	1998
	1993	1998	(1998 only)		
Primary or less	1.3	0.98	2.96	4.7	3.16
Secondary - ≤ 4 yrs	45.3	47.22	31.58	63.0	63.86
Secondary - > 4 yrs	15.3	14.59	22.37	8.8	13.27
Tertiary - ≤ 2 yrs	19.3	17.05	17.76	11.2	11.17
Tertiary - > 2 yrs	18.8	20.16	25.33	12.3	8.54

The Chi square test indicated the differences were highly significant. Thirty-seven percent of main computer users have tertiary experience, and 43% of the 'other user' have this experience compared with 20% of the non-users. This difference is marked. The 1993 figures are very similar.

Putting together all the information on objectives, age and education gives Table 8.

Table 8
Objectives, Scores, Age and Education
Based on a 10 (very important) to 1 (not important) Scale

Objective Orientation*	Age (Yrs) +			Highest Level of Education Reached			
	<30	30-50	>50	>2 yrs 3 ⁰	1-2 yrs 3 ⁰	>3 yrs 2 ⁰	All Others
Production	7.05	6.92	6.76	6.63	7.13	7.09	6.81
Money	8.07	8.09	7.95	7.73	8.00	8.07	8.11
Enjoyment	7.97	8.28	8.25	8.14	8.14	8.25	8.31

* Production = sum of scores (1 to 5) 'to be the best producer' and 'to be the most productive'.

Money = sum of scores (1 to 5) 'to make as much money as possible' and 'to provide an income to raise my family'.

Enjoyment = sum of scores (1 to 5) on 'to enjoy farming' and 'to have a reasonable income and plenty of time to enjoy other interests'.

Other – thirty farmers who defined 'other' objectives have not been included.

- the production objective differences were significantly different by age (with components $p = .027$ & $.007$). The second part of the money objective (family income) was significantly different ($p = .004$), but not the first part ($p = .482$). Enjoyment was not significantly different.
- the education differences were not significant, though the production objective was tending towards significance ($p = .28$)

The data suggests the production and money orientations are less important for older farmers. This contrasts with a tendency to note 'enjoyment' is slightly more important. These trends are to be expected. There is little variation with education.

If the sum of the scores on the production objectives is regressed against age a strong relationship is obtained.

The equation 'production score' = 0.137 Age (yrs) is obtained with $r = 0.918$. The regression equation is highly significant.

There are clear differences in the managers' age and education between farm types. Tables 9 and 10 contain this data for all the farms surveyed.

Table 9
Managers' Age Relative to Farm Type
(See table 2.2 for farm type definitions)
Percentage of farmers by columns +

						1998	1993
Age (yrs)	Sheep	Beef	Dairy	Mixed	Other	All Farms	All Farms
≤ 30	3.97	1.60	2.75	10.28	22.58	6.11	9.4
31 to 40	20.63	17.65	21.82	31.78	19.89	21.36	29.0
41 to 50	35.91	33.69	32.63	31.78	30.64	33.58	31.3
51 to 60	28.17	28.34	28.18	20.56	18.82	26.44	21.5
≥ 61	11.32	18.72	14.62	5.60	8.07	12.51	8.8
Mean	48.12	51.23	48.83	43.86	47.58	48.37	44.72

+ $\chi^2 = 57.316$ $p = 0.086$

Beef farmers are older than the mean age, and mixed farmers younger. Note also the marked increase in the mean age of managers in 1998 compared to 1993. There is not quite a five year increase indicating the retirement/recruitment process is markedly different from a balanced situation. Perhaps this reflects a poorer outlook for retired people maintaining a reasonable standard of living. For the education levels there is a clear tendency for the second user of the farm computer (mainly a spouse) to have a higher level of education and possibly for the mixed farmer to similarly have spent longer in formal education. There also appears to be a slight increase in the education level in 1998 compared to 1993 despite the low turnover rate of managers.

Table 10**Managers' Education Relative to Farm Type**

(Average Score where highest education level attained is 1 for 1⁰ or less, 2 for 4 or less yrs of 2⁰, 3 for greater than 4 yrs 2⁰, 4 for 2 or less yrs 3⁰, 5 for more than 2 yrs 3⁰. See Table 2.2 for farm type definitions)

	1998					1993	
Age (yrs)	Sheep	Beef	Dairy	Mixed	Other	All Farms	All Farms
Manager +	2.82	2.76	2.76	3.04	2.71	2.79	2.69
Second computer user *	3.57	3.11	3.22	3.31	3.03	3.31	N.A.

+ The differences are significant (F = 5.621, p = 0.018)

* The differences are non-significant.

The portion of total income obtained from farming is similar for both computer owners and non-owners. The figures are 84.2% and 86.38% for the users and non-users respectively. The slight difference is not statistically significant. These are, of course, average percentages.

Some farmers obtain considerable 'other income'. Table 11 gives the percentages involved in other business operations.

Table 11**Non Farming Activity
(Percentages of Respondents)**

	Computer Users	Non-Computer Users
Consultancy, Contracting...	16.33	10.56
Manufacturing	2.82	0.84
Tourism	4.40	3.52
Fishing	0.47	0.14
Other	28.41	22.68
No Other Business	47.57	62.25

It would appear computer users tend to have some entrepreneurial flair.

When dividing farms into computer owning/non-owning groups and looking at the characteristics of those running other businesses relative to the 'no other business group', there are few differences.

Table 12 contains this data.

Table 12

**Managers' Characteristics Relative to Whether They Operate
Off-Farm Businesses**

	Computer Owners		Non-Computer Owners	
	No Other Business	Other Business	No Other Business	Other Business
Ave. age (yrs) \neq	45.3	45.9	49.7	51.4
Percentage with greater than 2 yrs $3^0 \neq$	15.2	24.5	7.8	9.4
Objectives - ave. scores on a scale 10 (very important) to 1 (not important) *				
Production	6.70	7.05	7.00	6.62
Money #	8.11	8.08	8.14	7.83
Enjoyment	8.22	8.10	8.40	8.25
Percent of sample in each column +	20.61	23.82	30.73	24.84

* See Table 5 for details.

+ For those answering this question (there were 118 invalid replies).

The row difference for money approach significance.

\neq The age and education differences were highly significant ($F = 58.8$ & 26.89 , with $p = 0.00$ in both cases).

It appears the people with other businesses have attended formal education for longer periods, but there is little difference in their ages or objectives. However, the differences are significant.

5. Ownership Details

Of the computer owning farmers 10.52% have more than one computer, and 16.64% do not use it for business purposes. Furthermore, 4.21% of the 'non-users' noted they had a computer which was not used for business and another 4.91% said they had access to someone else's computer.

Table 13 contains the reasons stated by non-computer owners for not having a computer.

Table 13
Reasons For Not Owning a Computer

Reason	Percentage
'No use to me'	25.09
Not economic/farm too small	15.08
Couldn't learn to use	14.60
Electricity supply unreliable	3.02
Too expensive	19.18
Don't know	7.36
Getting one soon	15.68

The 'No use to me' group make up a quarter of the farmers and presumably believe no matter what the cost or benefit a computer system could not help. The 'couldn't learn to use' group, together with the 'too expensive' and 'not economic' groups, which total nearly half (48.86%), may well require computers once the systems are easier and the costs reduce.

This data needs to be related to the answers to the 'how long to purchase' question. Nearly fifty eight percent (57.91%) of those answering the question (and 39.0% of ALL non-owners) said they would NEVER purchase a computer (which is less than the negative responses in Table 13). The remainder gave their purchase time frame as presented in Table 14.

Table 14

**Time to Purchase a Computer (Non-Owners)
AND Years of Ownership (Current Owners)**

	Percentage of Non-Owners		Percentage of 'Current' Owners	
No. of Years	1993	1998	1993	1998
≤ 1	8.0	10.57	25.5	0.9
1.1 to 2.0	9.2	14.09	10.8	22.9
2.1 to 3.0	5.6	4.58	15.4	23.8
3.1 to 4.0	2.8	2.99	7.9	17.5
4.1 to 5.0	8.2	7.57	10.0	13.9
5.1 to 6.0	3.2	0.35	9.6	7.9
6.1 to 7.0		0.53	4.6	
7.1 to 8.0		0.18	6.7	
8.1 to 9.0		0.0	2.1	
9.1 to 10.0		1.24	5.8	5.5
> 10.0			1.6	
Don't Know	14.1	-		
Never	48.6	57.9		
Mean yrs to buy	3.3	4.3	-	-
Mean yrs of ownership	-	-	4.1	5.7
Percent Non-Owners/Owners	75.60	57.28	24.40	42.72

There are clearly some inconsistencies with these figures in that the percentage indicating they will purchase is greater here than the number indicating they will purchase soon when asked why they did not have a computer. The reality is that more people have purchased, and continue to do so, than might originally have been anticipated. However, there are clear links between size of business, education and age. The 1993 survey demonstrated this correlation, and it is confirmed by this data. With time, business size will probably grow and education levels rise. As generations pass, the increasing computing familiarity that is started at most primary schools will mean age is no longer a factor.

It is interesting to compare the 1993 retention figures with the actual 1998 years of ownership figures. In 1993 17% said they would purchase within two years. Looking back in the 1998 figures it can be noted 17.5% have had a computer for approximately four years. Also note the 'never purchase' figure has now increased, but of a decreasing pool of non-owners.

Table 14 also contains the distribution of owners' experience in terms of the number of years they have had a computer. The increasing number purchased each year is clear, but perhaps the rate of increase has stabilised and perhaps may even decline a little. The average age of computers is 3.78 years indicating many have updated their machine. However, some 35% have a computer seven or more years old. It is clear that the software and systems of the day continue to provide the information required. Indeed, many would argue that while the software produces very different screen arrangements and while the operating systems have changed in appearance and ease of use, the basic functionality has not changed markedly. It is suspected once a farmer learns a system some are reluctant to take on a new system requiring a re-learning time input. Despite this 25.31% did note they are CONSIDERING an upgrade over the next year.

The uptake rate does not seem to be different between farm types - see Table 15.

Table 15
Years of Computer Ownership Relative to Farm Type *

	Column Percentages				
Years of Ownership +	Sheep	Beef	Dairy	Arable	Other
≤ 2 yrs	24.10	22.73	26.05	27.59	30.64
2+ to ≤ 4 yrs	22.05	29.54	19.07	29.31	9.68
4+ to ≤ 6 yrs	15.38	15.91	18.60	25.86	16.13
6+ to ≤ 8 yrs	13.85	3.41	14.42	6.90	6.45
8+ to ≤ 10 yrs	10.77	19.32	11.63	6.90	16.13
> 10 yrs	13.85	9.09	10.23	3.45	20.97
Percentage of computer owners in each farm type	31.55	14.24	34.79	9.38	10.03
Percentage of each farm type in the total sample	35.26	12.96	32.30	7.19	12.29

* See Table 2.2 for a definition of farm types.

+ $\chi^2 = 57.638$ p = 0.214

The small differences in 'year of ownership' percentages were not significant.

Relating length of computer ownership to social factors (see Table 16) indicates the early innovators had a higher education level and were perhaps a little younger when they first acquired a computer compared to recent purchasers. This is to be expected. There is little difference in their objectives.

Table 16
Managers' Characteristics Relative to Length of Computer Ownership

	Length of Ownership in Years			
	≤ 2 yrs	2+ to ≤ 4 yrs	4+ to ≤ 6 yrs	6 yrs
Average age (years)	44.11	44.84	45.19	47.32
Average education score *	2.86	3.02	2.98	3.36
Objectives based on a 10 (very important) to 1 (not important) score +				
Production	6.88	6.62	7.26	6.72
Money	8.13	7.97	8.35	8.02
Enjoyment	7.93	8.23	8.19	8.25#

$\chi^2 = 34.185$ $p = 0.025$

* See Table 10 for details - based on a 1 to 5 (highest) score.

+ See Table 5 for details.

NOTE - The average age differences were nearly significant ($p = .066$)
- Education score differences were not significant

Table 17 contains a comparison of non-computer owners' social factors with respect to the number of years before they expect to purchase.

Table 17
Non-Computer Owning Managers' Characteristics
Relative to the Number of Years Before Purchasing a Computer

	Years Until Purchase		
	≤ 2 yrs	2+ ≤5 yrs	5 yrs
Average age (years) *	50.95	43.06	37.44
Average education score +	2.57	2.69	2.93
Objectives based on a 10 (very important) to 1 (not important) score ≠			
Production	6.70	6.14	6.24
Money	7.86	8.27	8.67
Enjoyment	8.32	7.15	8.38

Note that most differences were non-significant, though age differences were highly significant and the enjoyment objective differences approached significance.

* Note that the average age of computer owners over 44.79 years.

+ See Table 10 for details based on a 1 to 5 (highest) score.

≠ See Table 5 for details.

While there is little difference in the average education levels (the younger people have slightly higher education), the ages for each group are markedly different. Surprisingly the older farmers expect to purchase sooner in contrast to the lower average age of existing owners. The explanation is not clear. Also surprisingly, the farmers who will wait over five years before purchase appear to have a greater interest in the 'money' as an objective than the others (perhaps 'thrift' is crucial to them?).

6. Hardware Details

Most computers are the 'desk top' form with only 3.14% being laptops. The processor types reflect the age distribution, 43.65% being pentiums, 26.87% 486's, 11.40% 386's and 4.89% 286's. Some 13% did not know the processor type. It is surprising this figure is not higher over the years. The hard drive capacity has increased markedly with only 12.78% having less than 100 Mbyte capacity. The 'don't knows' sit at 23.83% and 25.04% have 100 - 500 Mbytes with 12.43% and 25.91% having 0.5 - 1.0 and 1.0 - 10.0 Gbyte capacity drives respectively. CDRoms are penetrating the user world with 63.58% installed, sound cards stand at 44.27% penetration and zip drives are held by 6.28% of users. In the past every computer would have had a floppy drive, but at 91.21% this is no longer the case. Presumably the CDRom is the only interface for the other 9%. With most computers being 'IBM compatible', the DOS and Windows interfaces predominate. Table 18 contains the proportions. Of course, the total of the proportions is greater than 100% as more than one system is required in most cases.

Table 18
Operating Systems Used

Type	Percentage
DOS (including PCDOS, DRDOS, ...)	42.70
Windows 3.X	36.26
Windows 95	49.76
Windows NT	5.02
MacIntosh	2.35
OS/2	0.31
Other	0.63
Don't know	3.14

It is likely an increasing quantity of electronic equipment will appear on farms, particularly units capable of being connected to the farm computer. Currently 13.67% of users have weighing scales, 2.2% weather instrumentation, and 2.83% 'other' various pieces of equipment. Clearly, few farmers have considered such gear practical at this stage. However, other electronic equipment plays its part in the farm office. Table 19 contains details of business machines held by both owners and non-computer farms.

Table 19
Business Machines Held

Machine Type	Percentages of:	
	Computer Users	Non-Computer Users
Fax	68.45	33.72
Telephone answering device	58.56	31.39
Cellular phone	54.00	28.57
Photocopier	19.78	10.42
Other	3.9	5.39

Computer owners' interest in other machines is clear, though it is not known how many of the faxes are an integral part of the computer.

7. Computer Use

Farm business computing is clearly the most dominant use of the computer taking 56.59% on average of the time. However, leisure use at 17.46% is also important. The remaining time is spent on learning and education (12.96%) and off-farm business activity (12.98%).

There is quite a wide range of levels, however, with some 33% spending nothing else but 81-100% of time on farm business computing, and at the other extreme, 16.76% are in the 0-20% range of time on farm business computing. Overall, the distributions are quite flat indicating the wide range of levels of each activity.

For business type activities, Table 20 contains the average hours spent using various packages.

Table 20
Time Spent on Business Computing Functions

Function	No. Users	Average Hours per Month	
		Over-Users of Each Function	Over all Users
Word processing	363	7.52	5.34
Spreadsheet	232	5.40	2.45
Database	133	5.68	1.48
Financial & Accounting	386	7.69	5.81
Production Records	203	4.84	1.92
Computer-aided Drawing	42	7.48	0.61
Communication	117	6.36	1.46
Electronic Banking	54	4.29	0.43
Other	32	22.34	1.40
			20.90 hrs/month 4.81 hrs/week

The importance of word processing, financial and accounting activity is clear, though for some users other activities are very important - for 42 users, for example, computer aided drawing uses many hours of attention.

Compared to the 1993 survey, hours/month have decreased from 30 to 20. Perhaps this is a function of the greater number, if less dedicated, enthusiasts, or perhaps the time spent at the keyboard is used more efficiently and/or less time spent on learning?

Dividing the data on the time spent on various computing tasks into farm type categories (Table 21) shows there are no major differences other than the mixed farmers spending more time on financial matters. This is understandable. Also note that dairy, and beef to a lesser extent, spend less time in total on their computing.

Table 21
Time Spent on Business Computing Functions
Relative to Farm Type

	Hours per month				
Function	Sheep	Beef	Dairy	Mixed	Other
Wordprocessing	4.41	5.09	4.14	4.13	4.87
Spreadsheet	2.07	1.16	1.84	1.57	4.05
Database +	1.38	0.55	1.09	1.03	2.20
Financial accounting	4.42	3.48	4.23	7.52	7.39
Farm production records	1.58	1.04	1.89	1.91	1.02
Computer aided drawing *	0.71	0.61	0.37	0.38	0.32
Communication	1.23	1.00	1.40	1.00	0.90
Banking (electronic) #	0.29	0.22	0.43	0.54	0.51
Other	0.98	3.48	0.51	1.69	0.57
Total	17.07	16.63	15.90	19.77	21.83

* See Table 2.2 for farm type definitions.

+ Differences highly significant ($\chi^2 = 272.998$, $p = 0.00$)

* Differences significant ($\chi^2 = 77.225$, $p = 0.013$)

Differences nearly significant ($\chi^2 = 70.436$, $p = .093$)

All other differences not statistically different.

The farm manager is the main user of the computer, but his or her spouse is also an important user, and in some cases is the main user. Table 22 contains both these proportions as well as the percentage of the potential users that carry out various functions.

Table 13
Business Computing by Type of User

	Farm Manager	Manager's Spouse	Farm Worker*	Adult Family	Children
Percentage of total use	48.85	29.65	1.74	6.59	13.16
Percentage Performing:					
Financial records	70.9	65.41	27.78	36.71	2.00
Financial budgets	59.59	30.83	27.78	21.52	0.0
Performance records	34.01	13.53	44.44	12.66	1.33
Stock production	32.27	12.41	11.11	7.59	1.33
Feed budgets	17.73	5.26	11.11	7.59	0.0
Letter and report writing	48.84	79.93	55.56	64.56	58.67

* Includes Secretarial Staff

Farm children provide a useful supporting role in that they provide 13.16% of total business computing, but this is mainly word processing in that nearly 60% are involved in this function. For the major users, the manager and her or his spouse, it is only in the financial recording area that more than 60% become involved. Nearly 60% of managers carry out financial budgeting, but nearly 80% of spouses use the word processor. The pattern, therefore, is both the manager and spouse being involved in the financial recording, the spouse and children writing letters and reports, with the manager being the planner (budgeting).

Table 23 contains distribution data of the average 'percentage of use' data.

Table 23
Distribution of Business Use
Percentage Contributed by User Type

	Percentage in Each Range Group				
	0-20%	21-40%	41-60%	61-80%	81-100%
Farm Manager	20.93	11.34	12.21	11.05	44.45
Managers' Spouse	35.61	12.88	12.88	11.36	27.27
Farm Worker	50.0	0.0	5.56	22.22	22.22
Adult family member	50.63	15.19	12.66	3.80	17.72
Family children	48.67	10.0	16.67	9.33	15.33

The distributions tend to be peaked at either one or both ends, as might be expected one person in each group probably specialises in one or more functions.

It might also be hypothesised that there would be a relationship between farm types and the proportion of computing conducted by the manager. Table 24 confirms this data.

Table 24
Proportion of Computing Carried out by Managers
Relative to Farm Type

Percentage	Column Percentages *				
	Sheep	Beef	Dairy	Mixed	Other
0 to 25	22.95	21.45	24.35	14.29	35.13
26 to 50	14.75	16.67	15.65	25.00	10.81
51 to 75	7.38	4.76	11.30	7.14	10.81
76 to 100	54.92	57.14	48.70	53.57	43.25

* $\chi^2 = 19.585$, $p = 0.848$

The differences are small except in the dairy area where there would appear to be a greater involvement by other operators.

'When the need arises' is the main computing habit. Table 25 presents the normal computing patterns. Compared with 1993 more people seem to be using their computer at times appropriate to

management, and less on ‘rainy days’ and on monthly basis. This might suggest computing is becoming an integral part of management rather than a special, more isolated event.

Table 25
Time at Which Computing Occurs

	Percentages	
Time Period	1993	1998
A regular period each week - evenings	{35.90	14.51
A regular period each week - daytime		16.11
A regular period each month	27.80	22.83
On rainy days	11.10	3.54
In spare time / when the need arises	22.2	42.13
Several days at the end of the financial year	0.50	0.88
Other	2.5	-

Of the approximately 20 hours spent on business computing each month, 4.71 hours are noted as being taken from what used to be spare time. Some 15 hours per month of farm work, presumably, has moved into computing. Furthermore, some 57% said the time going into business computing was increasing. This does not totally comply with the observation that since 1993 computing time has decreased. Either there is mistaken reporting, or there is a wide variation in time commitments. A mixture is likely.

The continuing importance of financial recording, financial planning and budgeting, and word processing is clear from the data on the time spent on the main computing functions. In 1993 2.93, 2.72 and 1.58 hours/month were spent on these functions, but these have now increased to 3.45, 3.47 and 3.01 hours per month. Also of interest is the wider range of functions that are now possible, particularly banking and communication functions. Table 26 contains the details.

In comparison with the 1993 figures the time spent on almost all business computing use has increased - indicating possibly that the users believe they are obtaining benefits, though another explanation might be that each task is taking long than it used to with the widening range of computer experience and skill. Again it is likely that both explanations apply to different user groups.

Table 26**Time Spent on Business Computing Functions**

	Average Hours/Month All Users		Average Hours/Month Users of Each Function		No. of Respondents
	1993	1998	1993	1998	1998
Financial budgeting	2.72	3.47	3.91	5.25	320
Livestock recording	1.59	2.04	4.61	5.36	184
Enterprise budgeting	0.20	0.54	1.25	2.87	92
Paddock/production recording	0.20	0.62	1.77	3.01	99
Letter and report writing	1.58	3.01	2.85	5.54	263
Financial recording	2.93	3.45	4.79	5.45	307
Electronic banking & tax	-	0.79	-	4.87	79
Spreadsheet calculations	0.70	0.67	2.34	3.38	96
Feed budgeting	0.14	0.40	1.89	3.01	65
Communication (faxes, Email)	-	1.21	-	4.39	134
Internet access	-	1.83	-	6.97	127
Other	0.70	2.98	7.08	19.51	74

Internet and communication activities are becoming a significant activity, as is electronic banking. When asked to rank electronic banking and the electronic receipt of bank statements on a 5 (very easy) to 1 (very difficult) scale the 50 or so respondents who answered gave an average score of 3.91 and 3.93 respectively. Few, therefore, find these procedures difficult, but large numbers are yet to use these facilities. When asked what improvements they would like, the three main comments were 'reduced cost' (35.48%), 'more flexibility (29.03%) and 'easier to use' (22.58%).

Table 27 contains the percentages in each age group using electronic banking and tax returns. Again, the younger farmers tend to be the innovators, though it appears the quite young have yet to find their confidence.

Table 27**Age Distribution of Computer Owners Using Electronic Banking and Tax Returns**

Age Group	Percentage in Each Age Group *	Whole Sample Percentage in Each Age Group
≤ 30 years	2.63	6.11
31 to 40 years	31.58	21.36
41 to 50 years	39.47	33.58
> 51 years	26.32	38.95

* Column differences are not significant.

In a more general vein, when asked what additional tasks they would like to have available on their computer, 132 responded with ‘greater data capture’ (12.0%), ‘more flexible interfacing’ (12.8%), ‘integration between systems’ (10.4%), ‘more reliable’ (8.0%) and ‘improved reporting’ (7.2%). Most would agree with these sentiments, though generally users seem to be accepting of what is currently available.

8. Attitudes to Computing

The majority of users believe the increased return from computer systems at least covers its costs. Table 28 contains the responses obtained in both the current and the 1993 surveys.

Table 28**Computer Profitability**

	1998 Responses	1993 Responses
	(Percentage in Each Category)	
Extremely valuable	43.23	65.2
Moderately valuable	38.40	
Benefits just cover costs	7.24	12.3
Not economic, but must use	11.13	22.5

In that 88.87% believe their costs are covered, there appears to be an increasing number believing in profitability of computer use. Furthermore, some farmers (17.4%) noted they had purchased a computer for non-business activity and progressed to business use through a realisation of the possibilities.

Table 29 contains information on farm type and the managers' view of value.

Table 29
Managers' View of the Value of Computing
Relative to Farm Type *

	(Column Percentages) +				
View of Value	Sheep	Beef	Dairy	Mixed	Other
Extremely valuable	44.94	36.36	43.62	44.68	43.33
Moderately valuable	39.89	37.88	37.77	36.17	38.33
Benefits just cover costs	7.30	7.58	6.38	8.51	8.33
Not economic	7.87	18.18	12.23	10.64	10.01

+ $\chi^2 = 570.75$, $p = 0.00$

* See Table 2.2 for farm type definitions

The only difference of note is the beef farmers' more negative value of a computer system usefulness. Perhaps this result relates to the relative simplicity of this form of production, or a lack of useful tools tailored to beef systems..

The managers' view of computer value appears to be related to age, farm size and education. Table 30 contains the details.

Table 30

Value of Computing Relative to Farmer Characteristics

	Managers believing their computing is:			
	Extremely Valuable	Moderately Valuable	Just Break Even	Not Economic
Ave. age (years) 1998	44.54	45.42	46.44	48.07
Ave. age (years) 1993	42.5	42.5	43.5	47.7
Farm size (su) *	7536	4310	3394	3660
Highest Level of Education - column percentages #				
> 2 yrs 3 ⁰	24.8	21.5	10.5	17.2
≤ 2 yrs 3 ⁰	18.9	18.0	13.1	15.5
≥ 4 yrs 2 ⁰	13.5	13.0	21.0	12.1
< 4 yrs 2 ⁰	42.8	47.5	55.4	55.2
Years of computer ownership - column percentage ≠				
≤ 2 yrs	14.85	25.00	41.03	31.67
2+ to 4 yrs	18.34	19.50	25.64	33.33
4+ to 6 yrs	19.65	20.00	15.39	11.67
6+ to 8 yrs	13.10	13.00	10.26	6.67
8+ to 10 yrs	15.28	12.50	5.13	8.33
> 10 yrs	18.78	10.00	2.56	8.33
Average Objective Score based on a 10 (very important) to 1 (not important) Scale +				
Production	7.25	6.68	6.58	6.90
Money	8.21	8.00	8.27	7.89
Enjoyment	8.17	8.13	8.76	8.22

* See Table 1 for su (stock unit) definitions. In 1993 the average su for computer farms was 4561, and for non-computing farms was 3146.

+ See Table 5 for details. The differences were not significant.

Note - the 1998 ave. age differences were highly significant (p = .011)
 - the farm size differences were nearly significant (p = .154)

$\chi^2 = 18.012$ p = 0.323

≠ $\chi^2 = 39.766$ p = 0.00

In both 1998 and 1993 the younger computer users seem to value the computer more as do managers of large properties and those with higher levels of education. There doesn't, however, appear to be any differences in their objectives.

Another reason for switching is a growing confidence. The help and assistance provided must be an important factor for new users. The respondents were asked to indicate their best source of help as well as the most difficult part of computing. Table 31 contains the responses.

Table 31
Best Source of Help and the Most Difficult Part of Computing

Help Source	Percentage	Difficulty	Percentage
Neighbour and/or friend	21.8	Entering information	12.3
Family member (children...)	20.1	Getting the right reports	10.6
Agent or consultant	36.5	Remembering procedure	57.1
Farm consultant	2.6	Copying information	3.0
School or polytech	2.4	Understanding the manual	34.2
Accountant	10.8	Finding help for each topic	16.6
Software Help Desk	25.5	Other	10.8
Other	7.4		

The computer agent/consultant is a major source of help, as are friends, family and the help desk. Two major difficulties stand out; remembering what to do and understanding the manuals. The solution requires the development of intuitive systems.

It is surprising that more training is not provided with computer purchases - currently only 24.14% receive this support despite the assistance provided by the agent later in the life of a computer. Learning basic computer skills absorbs around 40.15 hours. On average, this comes from 10.12 hours of groups courses, 2.09 hours of one-to-one training and 27.94 hours of self-teaching. However, these figures are much higher for many farmers. For example, for the 306 farmers who said they attended a group course, the average time involved was 15.08 hours and for the 307 who self-trained they believed they had spent 41.5 hours. These are significant inputs which should decrease as the national skill base is improved. The benefit of formal training is also obvious.

When asked to list the desirable improvements in help systems and software, a range of expected answers were offered. Table 32 contains the details.

Table 32**Suggested Improvements in Help and Software**

Improved Help (163 respondents)		Improved Software (151 respondents)	
Suggestion	Percentage Requesting	Suggestion	Percentage Requesting
Better trained staff	55.1	Ease of use	41.7
More detailed on-line help	12.6	Integration of package	9.7
Toll free assistance	13.3	Faster	5.6
Improved manuals	4.4	More flexible	14.6
More courses	3.8	Better reports	3.5
Reduced costs	3.8	More reliable	2.1
		‘Other’	12.5

Clearly, many users still find the software difficult to use, and find many of the people helping them are not as familiar with the packages as might be desirable.

9. The Internet and Its Use

In previous surveys the Internet was probably of little consequence and few, if any, farmers used it.

In 1998 the situation is quite different. Of the 637 computer-using respondents 178 people are connected to the Internet, 385 are not, and 75 did not respond to the question. Thus, at least 27.94% are connected, though the true figure could be slightly higher. It is very likely this percentage is growing rapidly. Of the 385 not connected, some plan to connect quite soon (40% in less than 2 years). Table 33 contains the nominated time spans.

Table 33**Time Before Expect To Have An Internet Connection**

Years	Percentage of the 385 Responders
< 1	17.92
1 - 2	22.08
2 + 5	15.06
Don't know	38.44
Never	6.23

The 'never' category is surprisingly low and at least another 40% expect to connect over the next two years. It would be surprising if this level did actually connect within this time frame, though no doubt the intentions are there. The major reason (29.73%) for not being connected is given as 'do not have a modem' - perhaps as new computers are acquired this problem will be overcome as most will have built-in modems. Only 7.53% said their telephone line was of insufficient quality, but a further 17.18% said the toll call costs were too great. The remainder had a range of less important reasons.

An analysis of the characteristics of internet users does not appear to indicate they are very different to other computer owners, other than that their highest education level appears to be greater. See Table 34 for the details.

Table 34
Relative Characteristics of Internet Users

	Connected Farmers	Non-Connected Computer-owning Farmers
Ave. age (years)	45.23	45.89
Farm size (su *)	6605	4761 #
Managers' Highest Level of Education: ≠		
% with > 2 yrs 3 ⁰	30.7	11.3
% with ≤ 2 yrs 3 ⁰	13.6	13.8
% with > 4 yrs 2 ⁰	15.9	13.5
% with lower levels	39.8	61.4
Objectives + on a 10 (very important) to 1 (not important) Scale: **		
Production	7.0	6.8
Money	7.9	8.0
Enjoyment	8.1	8.2
Objectives		
% rating money highly	45.1	52.1
% rating enjoyment highly	54.9	47.9

The age and farm size differences are not significant. However, if two very large farms are removed the size difference becomes significant ($p = 0.027$)

* See Table 1 for details of the stock unit calculations..

+ See Table 5 for detail of the scoring.

≠ The education differences are highly significant ($\chi^2 = 21.1$, $p = 0.00$)

** The money objective differences approach significance, but not the others.

The difference in farm size may also be important, though not statistically significant in the conventional sense.

The Internet users operated mainly on a ‘time used’ basis of payment (85.4%) - the remainder were on a fixed time contract system. Most (52.02%) did not know the speed of their modems, but the next biggest group (25.43%) had one with a speed of 28 801 bps or greater. The others had speeds of < 2400 bps (1.73%), 2401 - 9600 bps (4.62%), 9601 - 14 400 bps (10.40%), 14 401 - 28 800 bps (5.78%).

The average hours per month spent connected was 7.82, and the average cost per month was \$23.97.

Table 35 contains data indicating the type and frequency of connections.

Table 36
Type and Frequency of Internet Use

Type	Percentage of Users		
	Never	Occasionally	Frequently
Email	9.4	34.1	58.8
News and Weather	42.9	38.2	5.3
Market Information	48.2	29.4	7.1
Technical Information	28.8	47.6	12.3
Economic Information	51.2	31.8	2.3
Agr. Legislation Updates	68.2	14.1	0.0
Research Results	55.3	22.9	4.7
Entertainment and Fun	25.3	46.5	19.4
Ordering Equipment and Supplies	61.8	19.4	2.3

E-mailing is clearly an important activity, with ‘entertainment and fun’ also being important, but ‘acquiring technical information’ is also a significant use. All other uses are in the ‘occasional’ basket, but again ‘technical information’ features prominently. Clearly, interest in legislation changes through the Internet is low, as is the interest in obtaining research results. Knowledge of where and how to obtain this information may not be good. Users’ knowledge of how to obtain information needs to be researched, as does the type of information they are seeking. These are crucial questions.

The farm type breakup of Internet use (see Table 36) indicates that beef farmers tend to be lower users of email, but are very interested in economic and marketing information and that dairy and mixed farmers are higher users of technical information. However, only small numbers are involved in the analysis.

Table 36

The Farm Type of Internet Users Relative to Type of Use

	Percentages of each type using each function frequently					
Type of Use *	Sheep	Beef	Dairy	Mixed	Other	All Farms
Email	62.9	36.4	58.1	47.1	60.9	58.8
News and weather	5.5	13.6	1.6	5.9	4.3	5.3
Econ. & Mkt. information	9.2	22.7	4.8	0.0	13.0	9.4
Technical	7.4	0.0	17.7	23.5	8.7	12.3
Research results	0.0	0.0	4.8	11.8	13.0	4.7
Ordering supplies	1.8	4.5	1.6	5.2	0.0	2.3
Fun	11.1	13.6	24.2	17.6	26.1	19.4

* The 'email' differences were not significant ($p = 0.291$), the 'news & weather' differences were significant ($p = 0.046$), the 'econ & mkt info' differences were not significant, but the 'technical' differences were nearly significant ($p = 0.071$), as were the 'research results' ($p = 0.237$), but the 'ordering supplies' were certainly not significant, nor were the 'fun' differences.

As many information providers are interested to know the use of the material supplied, the respondents were asked to give the time spent 'visiting' various sites. Table 37 contains this data.

Table 37

Time Connected to a Range of Information Sites

Information Source	Percentage of Responders (total respondents = 60)	Average hours per month for users of the site	Average hours per month across ALL respondents
MAF	31.67	1.5	0.47
Agrifax	21.67	0.81	0.19
Crop and Food Research	13.33	0.87	0.12
NIWA	8.33	0.90	0.07
Dairy Board	25.00	1.31	0.33
LIC	26.67	1.72	0.46
Massey University	13.33	1.49	0.20
Aust. B of Agr & Res Econ	5.0	0.67	0.03
AgResearch	25.0	0.88	0.22
Landcare	5.0	0.67	0.03
Hort Research	6.67	0.87	0.06
Meat Board	28.33	1.06	0.30
WRONZ	3.33	0.75	0.02
Lincoln University	5.0	1.33	0.07
US Dept of Agr	21.67	1.69	0.51
Other	23.33	2.36	0.55
Total			3.63

There is not a lot of use made of these sites - with 60 respondents it appears approximately one-third of people with an Internet connection use the information available from the MAF, Dairy Board, LIC and Meat Board. These providers have 25% or more of the users visiting their sites.

The total average hours per month spent connected is 3.63 or approximately an hour per week. For experienced users they could retrieve an appreciable quantity of information in this time.

When asked about the type of information they could not find but would like, 76 respondents provided the data given in Table 38.

Table 38**Internet Information Required but not Available**

Type of Information	Percentage of Responders (76)
Market and Economic	40.79
Technical Data	39.47
Professional Services (consultants, banks, stock agents...)	39.47
Farm equipment and animal supplies	65.79
Other	17.10

How much of this information is available but simply not being located by the users is unknown. It seems at least a third of the limited number of responders want more of most areas of interest. Despite this, a reasonable number believe the Internet as a whole is valuable to them. Table 39 contains the responses.

Table 39**Views on the Value of the Internet**

	Percentage of Responders (169)
Very valuable	18.34
Valuable	28.99
Neutral or undecided	37.28
Not valuable/waste of money	4.14
No opinion	11.24

It is suspected that E-mail is a major source of the value of the Internet. Of the 166 responders to a question on the use of E-mail, 83.13% indicated they used it to communicate with friends and family, and 45.18% used it for their farm business. A further 12.05% said while they could use E-mail, they did not as presumably they did not know how to use it.

While the numbers available for analysis are relatively small, it does appear that there is a correlation between education and the perceived value of the Internet. Table 40 gives the details. This data also indicates that age is probably not a factor.

Table 40**Perceived Value of the Internet Relative to Farmer Characteristics**

	Column Percentages	
Age (yrs) *	Rated Valuable or Better	Rated Not Valuable, or Neutral/Undecided/No Opinion
< 30	6.41	0.0
30 to < 40	32.05	29.88
40 to < 50	38.46	42.53
50 +	23.08	27.59
Education – highest level attained: +		
> 2 yrs 3 ⁰	43.84	22.62
≤ 2 yrs 3 ⁰	13.70	14.29
> 4 yrs 2 ⁰	8.22	20.24
≤ 4 yrs 2 ⁰	34.24	42.85

* Differences are significant ($\chi^2 = 10.562$, $p = 0.032$)

+ Differences are nearly significant ($\chi^2 = 7.227$, $p = 0.125$)

There does not appear to be any farm type differences in the uptake of the Internet. Table 41 contains the relevant data. The differences in hours of use and cost between farm types are neither great nor significant.

Table 41**Use of the Internet Relative to Farm Type ***

	Sheep	Beef	Dairy	Mixed	Other
% of Internet Users	30.34	12.36	34.83	9.55	12.92
% of total sample	35.26	12.96	32.30	7.19	12.29
Connect hours / month	5.62	6.93	10.12	9.93	5.53
Connect cost / month (\$)	23.90	25.47	25.64	22.44	18.77

* See Table 2.2 for a definition of farm type.

Note – none of the row differences were significant, though the cost/month differences approached significance ($p = 0.148$)

Further analysis of all computer users does not show up major differences when categorised by the percentage of computing carried out by the manager relative to other users (spouse, children.....). Table 42 contains the details.

Table 42

Computer Owning Managers' Characteristics Relative to the Proportion of Computing Carried Out by the Manager

	Percentage of Computing Carried Out:			Spouse Carried out > 50%
	> 75%	75% to > 50%	≤ 50%	
Average Age (yrs)	45.37	43.44	44.19	38.31
% with 3 ⁰ education	42.0	48.0	51.3	36.0
% noting computing was extremely valuable	47.4	52.0	38.05	42.98
% using the internet	30.9	36.0	35.4	29.82
Ave. hours of internet use	7.99	10.19	8.08	10.81
Objectives: Ave. scores on a scale 10 (very important) to 1 (not important): *				
Production	6.77	7.59	7.08	6.12
Money	7.87	8.25	8.33	8.53
Enjoyment	8.25	8.62	7.99	8.40

* See Table 5 for details.

NOTE - None of the differences in the rows were statistically significant except for the money objective row. Money per se was different with $\chi^2 = 21.48$ and $p = .044$

Note the small differences in the percentage using the internet, and the hours of internet use. The only other factors of note are the increasing level of tertiary education with decreasing managers' computing level (delegation...) and, similarly the increasing emphasis on the 'money' objective.

Overall, while the Internet potential is enormous, there is a long way to go in making available relevant and appropriately presented material, in devising appropriate charging systems and in educating primary producers in its efficient use. Break-throughs will take some time as the demand will not be great until good information is generally available, and it will not be economic to provide appropriate information until the demand is higher. However, small gains will constantly occur, particularly in the low 'cost of provision' areas.

10. The Nature of Managers

The acquisition and effective use of a computer as a management aid appears to be increasingly important – most current users clearly believe this. Furthermore, the outside world is increasingly using computers and electronic communication as cornerstones to their operations so eventually primary production will not be possible without suitable computer packages. Whether they wish it or not, managers must learn to use a computer system. To aid this educational process it is important to understand the nature of farm managers, particularly with respect to computer use. This will assist the design of training programmes for adjusting attitudes and approaches. As a move in this direction a factor analysis was carried out on the data available. This tended to indicate farmers could be grouped into four categories. These have been labelled the ‘Producer’, ‘Family Man’, ‘Enjoyer’, and ‘Studier’.

Various combinations of variables, factor numbers and rotations were explored. These all pointed to the existence of four underlying factors or types. Other studies have concluded a similar number of factors can be isolated (see, for example, Perkin & Rehman (1994), Fairweather & Keating (1990)) – though these studies were not computer orientated.

Table 43 below gives the factor loadings and communalities of the variables used in the basic analysis. A varimax rotation was used, though an oblique rotation (oblimin) pointed to similar loadings. The data was standardised and the covariance matrix used. This analysis included all farmers, both computer owners and non-owners. When grading each of the objectives (on a 1 to 5 scale) the farmers were also given the opportunity to write in an ‘other’ objective. When this is included in the analysis the percentages of variance explained jumps to 63%. It seems they each have a unique objective which, due to their great variety, could not be summarised in the report. However, while this additional factor is a significant contributor to the variance explanation, it did not alter the factoring into the four basic types.

Table 43
Factor Loadings Explaining The Nature of
The Four Farmer Categories

	Factor Number				
Variable	1	2	3	4	Communality
	(‘Producer’)	(‘Family Man’)	(‘Enjoyer’)	(‘Studier’)	
Objective 1 *	1.73	.03	.14	.07	.55
Objective 2	.84	.04	.08	.03	.72
Objective 3	.47	.19	.04	.01	.26
Objective 4	.14	.11	.64	-.06	.41
Objective 5	.07	.60	.08	-.02	.38
Objective 6	.12	.32	.25	-.04	.18
Education Level	-.05	-.07	.04	.51	.27
Age	-.03	-.23	.06	-.33	.17
Size of business (su) +	-.07	-.04	-.06	.14	.03
Variance explained (%)	19.78	7.58	6.77	5.34	$\Sigma = 39.47$

* Note - the objectives are
(See Table 5)

- 1 To be the best farmer/producer
- 2 To be the most productive
- 3 To make as much money as possible
- 4 To enjoy farming
- 5 To provide an income to raise my family
- 6 To have a reasonable income and plenty of time to enjoy other interests.

+ The size of business was measured in stock units (su) - see Table 1.

The factor loadings indicate the ‘Producer’ stresses production and, to a lesser extent, money. The ‘Family Man’ has no major loadings other than the family objective and, to a lesser extent, a leisure time aspect. The ‘Studier’ seems to be single-minded in that education is the primary variable, though the -.33 factor loading on the age variable indicates a tendency towards youth. The ‘Enjoyer’ similarly is single-minded in that the major factor loading relates to the enjoyment objective, though there is again a tendency towards leisure time – this is to be expected. It should also be noted factors that might be related to size of business are not important (communality .03). Age is also only a minor variable.

Of crucial significance is whether computer owners are inherently different in some way to non-owners. If this was the case education and promotion systems, and perhaps even software design, might well have to be different in some way. Given nearly half of the producers now have a computer it is an appropriate time to make this assessment.

To achieve this survey respondents were divided into the two computer owning groups and the factor analysis repeated. Table 44 contains the results.

Table 44
Factor Loadings for Computer Owners and Non-owners
 (See Table 43 for definitions)
 Column A = owners' loadings; Column B = non-owners' loadings

	Factor									
	1		2		3		4			
	A	B	A	B	A	B	A	B	A	B
Objective 1	.77	.70	-.01	.05	.09	.16	-.08	.04	.61	.52
Objective 2	.78	.89	.02	.02	.08	.08	-.01	0.0	.62	.81
Objective 3	.42	.52	.18	.22	.08	-.01	-.03	-.06	.22	.32
Objective 4	.17	.11	.06	.15	.64	.70	.12	.02	.46	.53
Objective 5	.06	.11	.59	.59	.08	.017	.08	.12	.36	.38
Objective 6	.08	.16	.33	.32	.31	.17	.01	.01	.21	.16
Education level	-.01	-.04	-.14	-.05	0.0	.05	-.48	.27	.25	.08
Age	-.01	-.09	-.14	-.19	.04	.09	.20	-.59	.06	.40
Size of business (su)	.13	.02	-.04	-.03	-.12	0.0	-.19	.02	.07	0.0
Variance explained	17.86	22.96	6.64	6.52	6.90	7.09	4.20	6.22	Σ35.6	Σ45.3

The first factor in both groups (the 'Producer') are remarkably similar as is the second factor (the 'Family Man') as well as the third (the 'Enjoyer'). The difference lies in the fourth factor – the 'Studier'. For the non-computer owners education is a less important observed variable, but age becomes significant. This confirms, of course, all the data relating computer ownership to education and age. In simple studies size of business is also important, but clearly in these factor analyses a slightly different picture emerges, no doubt due in part to the inclusion of managers' objectives.

It is interesting to speculate on what has given rise to the particular objectives held by each manager. How much of the variability is due to genetic differences and how much is due to the childhood nurturing environment? Are farmers that were raised in rural areas different from those with an urban background? Is intelligence and personality a factor? Further studies will be necessary to provide useful conclusions (for work on personality, heredity and the environment see Matthews & Deary (1998), for the relationships between psychological variables and objectives see McGregor et al (1996)).

It must be stressed, however, that other than age and education level differences, the computer owners and non-owners do not appear to have different objectives. Whether their inherent abilities are different is not known. The tentative conclusion must be that there is no intrinsic reason why computer uptake levels will not continue at current levels. In this process educational and support programmes will be important and need to be designed with the nature of the current non-owners in mind.

The computer owners were further divided into various sub-groups and factorised to see if further differences might emerge. However, only minor differences appeared. For example, managers who used their computer more than ten hours per month relative to the others tended to load more onto the money objective for the 'Producer', and the 'Enjoyer' tended to have greater stress on the enjoyment objectives. In addition a further variable 'years of ownership' was introduced and was related to greater hours of use, as was size of business. For farms where the spouse carried out more than 50% of the computing the education, age and years of ownership variable featured in explaining a significant proportion of the variance. When all farmers that did not believe a computer was economic were excluded the money objective variable became more prominent in the 'Producer' factor. Maybe people with a major interest in cash returns put stress on making the computer work for them.

Finally, when all variables other than the objectives were excluded from the factor analysis the percentage of variance explained increased to 50.69%. The important factor loadings varied slightly as education was no longer a consideration, but the 'Producer', 'Family Man' and the 'Enjoyer' were clear factors. The fourth factor had the money objective as an important variable. It might be speculated that some families stress education as an important aspect to life and this becomes imprinted as an objective influencing later life. Clearly, these aspects need more detailed data collection specifically designed for this purpose.

11. Conclusions

The rate of computer system uptake continues at rates similar to recent years, and it appears this will continue for some number of years. Over the last five years, on average, 3.66% per year of the population became involved in computing. With 42.72% of primary producers currently owning a computer, this rate may well increase over the next few years as the business community around them increasingly relies on computers for day to day operations.

The correlation between computer ownership, higher levels of education, and large farm size shown in 1993 continues in 1998. These relationships must eventually decline except perhaps for the education situation as new industry entrants may have a generally higher rising level of education.

This 1998 survey asked farmers to indicate their involvement in off-farm business. This data showed computer owners tend to have other activities and consequently possibly gain greater value from their computers. The farmers with off-farm businesses left the formal education system at a higher level than the others.

It is very evident that computing activity is becoming a significant and important part of management. The number owning small computers has declined quite markedly in favour of standard MSDOS/WINDOWS type machines. In addition, the time spent on financial computing (accounting, cash flows, budgeting...) has increased compared to 1993 even though the total computer time per month is less. Perhaps computing time is spent more effectively, and, possibly, less time is spent on entertainment and learning. It should also be stressed that computing tends to take place regularly rather than on rainy days and/or in spare time compared to the 1993 situation.

It is also clear that the functions, other than the use of the Internet and electronic banking, have not changed much. Thus, having learnt financial management packages it appears producers are not keen to explore new packages such as, for example, feed management systems. Perhaps the packages available are not adequate, or possibly the perceived benefits do not outweigh the expected time commitment and cost.

An analysis of objectives and other personal factors suggests computer owners are not inherently different from non-owners. While their age, education and business size tend to be different, it seems their motivations are not. This means computer education and support systems will become increasingly important to enable the less confident to move into computing.

Similarly, a careful analysis of farm type shows computer uptake and practice is much the same across extensive sheep farming through cropping to intensive dairying. Age and education levels are also the same across farm types.

A striking factor is evident from the age information - the average age of farmers in 1998 relative to 1993 is higher. This clearly raises questions of whether this is due to decreasing retirement expectation income (and possibly lower land values), or whether there is simply a decline in the numbers of young people interested in farming. This demands further investigation. It is also interesting to note that farm size does not appear to be increasing despite the declining terms of trade - are farmers accepting lower income, or is off farm activity increasing?

It would have been interesting to obtain data on farm labour as perhaps less is employed in response to the economic situation (NZ Meat & Wool Board data indicates in 1985/86 there were 1.67 labour units/farm, and in 1995/96 this was 1.59). When it comes to computing there is a clear indication that the 'spouse' is heavily involved, and also other family members at times. Perhaps the same applies to other farm activities. Data on work hours would also be interesting.

A new factor in computing is clearly the internet. The data suggests over a quarter of computer owners have a connection, and this proportion is expected to increase quite rapidly. Currently email is the main use, but this may be a function of the services available not meeting farmers' requirements. This needs further exploration.

Compared with 1993, more farmers believe their computing activity increases income more than costs despite the fact that a wide range of farmers are now involved. This is encouraging. While comparative figures are not available it also appears the internet users believe this activity is profitable. It is very likely their view of value will continually improve as more services are made available.

Finally, it is important to note that education is a factor in many of the relationships explored. Computer owners tend to have greater formal education than non-owners, internet users similarly relative to those not connected, and farmers with non-farm businesses also tend to have higher education levels. While there is no definitive proof that education conveys greater economic returns, it certainly seems to relate to innovation and entrepreneurship as well as a belief that the innovations have conferred greater value.

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Appendix One

The Survey Schedule



National Survey

Computer Use in Primary Production

*All information given is strictly confidential.
Any published results will contain averages and non-identifiable information.*

Section 1. General

1. Please give the total land area used for primary production(all properties) using the easiest area unit.
_____ hectares or _____ acres

2. Please enter the livestock numbers wintered on the farm (*As at 1 July 1997*).

- 1) Sheep
- 2) Cattle
- 3) Dairy Cattle
- 4) Deer
- 5) Horticulture
- 6) Goats
- 7) Pigs
- 8) Poultry
- 9) Horses

10) Other (eg. Ostrich, Emu, Llama, Alpaca..) _____

3. Please enter areas of crops grown this season (1997-1998) and tick the appropriate units box.

1) Forage and feed crops

_____ ☐ ha ☐ ac

2) Cereal and pulses (eg. *Wheat, Barley, Oats, Dry peas*)

_____ ☐ ha ☐ ac

3) Small seeds

_____ ☐ ha ☐ ac

4) Process crops (eg. *green peas, sweetcorn, navy beans*)

_____ ☐ ha ☐ ac

4. For each of the following objectives rate the importance of each to you as a farmer on a 1 to 5 scale (1 = not important through to 5 = very important)

1) To be the best farmer/producer

2) To be the most productive

3) To make as much money as possible

4) To enjoy farming

5) To provide an income to raise my family

6) To have a reasonable income and plenty of time to enjoy other interests

7) Other (*Please specify*) _____

5. What percentage of your total income is derived from farming?

_____ %

6. What other business enterprises do you or your business group/ family operate?(*Tick one or more boxes*)
- 1) No other business operations ☐
 - 2) Other agribusiness eg. consultancy, contracting etc ☐
 - 3) Manufacturing ☐
 - 4) Tourism ☐
 - 5) Commercial fishing ☐
 - 6) Other (*Please specify*) _____ ☐

7. At what level did you complete your formal education? (*Please enter the relevant number in the box*).
If you have a computer also enter a number for the education level of the other (*if any*) significant user.
Otherwise leave blank.

Primary or less (1)

Secondary - four years or less (2)

Secondary - more than 4 years (3)

Tertiary - two or less years (4)

Tertiary - more than two years (5)

Owner/Manager

Other computer user

8. How many years have you been farming? _____yrs

9. What is your age? _____yrs

10. What business machines do you have?(*Tick one or more boxes*):

1) Fax machine ☐

2) Telephone answering machine ☐

3) Cellular phone ☐

4) Photocopier ☐

5) Computer ☐

6) Other (*Please specify*) _____ ☐

Section 2. Computer ownership

11. Which best describes your computer access? *(Please tick one box).*

- 1) Do not have access to a computer ☐
- 2) Have personal access to someone elses computer for business use ☐
- 3) Own one computer and use it for business ☐
- 4) Own more than one computer and use them for business ☐
- 5) Own a computer/s but do not use for business. ☐

*If you **do** own or have access to a computer for business use please go on to question 14*

12. Why do you not have a computer?(Tick one or more boxes)

- 1) No use to me ☐
- 2) My farm is too small/Not economic to have one. ☐
- 3) I don't think I can learn how to use one ☐
- 4) Getting one soon ☐
- 5) Electricity supply is not reliable (*problems with spikes and failures*) ☐
- 6) Too expensive ☐
- 7) Don't know ☐

13. If you do not have a computer or have a computer that is not currently used for business in how many years do you expect to purchase and/or start using your own computer for business related work. *(Please write 0 if you believe you will never use a computer for business)* _____yrs

If you do not have a computer that is all we require you to answer. Thank you for your help.
Please read the rest of this questionnaire if you're interested. ***Don't forget to use the pre-paid envelope enclosed to return your completed questionnaire.***

14. For how many years have you owned/used a computer? _____yrs

15. In what year did you purchase/or begin using your present computer? 19____

Section 3. Technical

16. What type of computer/s do you have? *(Tick one or more boxes)*

1) IBM compatible (DOS/Windows) ☐

2) Apple MacIntosh ☐

3) Commodore, Atari, Amiga ☐

4) Other *(please specify)* _____ ☐

17. Is your computer a: *(Tick both boxes if you have both)*

Desktop ☐

or Laptop model ☐

18. Which processor does your main computer have? *(write relevant option number in the box)*

(1) 286

(2) 386

(3) 486

(4) Pentium

(5) Don't know

19. What size hard drive does your main computer have? *(write relevant option number in the box)*

(1) <100 Mb

(2) 100-500Mb

(3) 500 -1 Gb

(4) 1-10 Gb

(5) Don't know

20. Does your main computer have any of the following? *(Tick one or more boxes)*

1) Floppy disk drives ☐

2) CDROM drive ☐

3) Soundcard ☐

4) Zip drive ☐

21. What operating system do you use? *(Tick one or more boxes)*

1) DOS (includes MSDOS, PC DOS and DRDOS) ☐

2) Microsoft Windows 3.11, 3.1 or 3.0 ☐

3) Windows 95 ☐

4) Windows NT ☐

5) MacIntosh ☐

6) OS/2 ☐

7) Other *(Please specify)* _____ ☐

8) Don't know ☐

22. Do you have any other specialist instruments or machinery that you use in conjunction with your computer? *(Tick one or more boxes)*

1) Weather instrumentation ☐

2) Animal scales or other recording system ☐

3) Grain drying or monitoring instruments ☐

4) Other *(Please specify)* _____ ☐

23. Are you considering upgrading your computer in the next year?

☐ Yes ☐ No

Section 4. Computer usage

24. What proportion of your computing time is spent on each? *(Give a percentage of total computing time)*

- | | |
|---------------------------|---------|
| 1) Farm business | _____ % |
| 2) Learning and education | _____ % |
| 3) Leisure | _____ % |
| 4) Off farm business | _____ % |

25. How many hours per month do you spend using each of the following packages? *(leave blank if zero)*

- | | Hours/Month |
|--|-------------|
| 1) Wordprocessor | |
| 2) Spreadsheet | |
| 3) Database | |
| 4) Financial and accounting | |
| 5) Farm production records | |
| 6) Computer aided drawing | |
| 7) Communication | |
| 8) Electronic banking | |
| 9) Other <i>(Please specify)</i> _____ | |

26. In the first column give the percentage of the total business computer time spent by each user. Then for each user tick which operations they most commonly perform.

	percent total time	Financial records	Financial planning (budgets)	performance records	Stock production / budgets	Feed budgets	Letter and report writing
Farm manager	%						
Managers spouse	%						
Farm Worker	%						
Adult family member(s)	%						
Family children	%						

27. What is the age of the other significant computer user? *(If the only user is yourself, leave blank)* _____ yts

28. Which statement best describes how often the computer is used for business? *(Please tick one box)*

- | | |
|--|--------------------------|
| 1) A regular period each week during evenings | <input type="checkbox"/> |
| 2) A regular period each week during daytime | <input type="checkbox"/> |
| 3) A regular period each month | <input type="checkbox"/> |
| 4) On rainy days | <input type="checkbox"/> |
| 5) In spare time | <input type="checkbox"/> |
| 6) Several days at the end of the financial year | <input type="checkbox"/> |
| 7) When the need arises | <input type="checkbox"/> |

29. On average, how many hours per month is the computer used for:-

Hours / Month

- 1) Whole farm financial budgeting (annual and cashflow)
- 2) Livestock data and recording
- 3) Enterprise budgeting (gross margin analysis)
- 4) Paddock / Production recording
- 5) Letter and report writing for business
- 6) Recording and analysing financial data (including GST)
- 7) Electronic banking and tax returns
- 8) Other calculations on a spreadsheet
- 9) Feed budgeting
- 10) Communication (faxes, email)
- 11) Internet access
- 12) Other uses (Please specify) _____

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30. How many hours per month of free time, that might have been spent doing other non-farming activities (eg. spending time with family, playing sport), would you now spend on the computer?

_____ hrs

31. If you use your computer to electronically process banking transactions (ie. do your banking by connecting directly to the bank) give a value between 1 and 5 for ease of use. (1= very difficult, 5= very easy)

32. If you receive bank statements electronically rank their ease of receipt on a scale of 1 to 5 (1= very difficult, 5= very easy)

33. If applicable what (if any) improvements would you like to see made to the electronic banking software you use?

34. For your farm, is the time spent on business computing increasing?
 No

☐ Yes ☐

35. Which statement best describes your view of the value of business computing?(Tick one box)

- 1) Extremely valuable
- 2) Moderately valuable
- 3) Benefits just cover costs
- 4) Not economic, but must use nowadays

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

36. Was the computer purchased for non farm use and then found useful for the farm enterprise?

☐ Yes ☐ No

37. Your best source of help for computer problems is: *(Tick the box of those that have been the most helpful)*

- 1) Neighbour and/or friend
- 2) Children or other family member
- 3) Computing agent or consultant
- 4) Farm consultant
- 5) Local school or Polytech
- 6) Accountant
- 7) Software help desk
- 8) Other _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
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<input type="checkbox"/>
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38. The most difficult part of computing is *(Tick one or more boxes):*

- 1) Entering information
- 2) Getting the right reports
- 3) Remembering how to do things
- 4) Making copies of information
- 5) Understanding the manual
- 6) Finding the right topic in online help

☐

7) Other _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

39. Give the time in hours you have spent on computer training/courses

- 1) Group course/s
- 2) One to one training
- 3) Training yourself

hrs _____

hrs _____

hrs _____

40. Was training included as part of your computer purchase?

☐ Yes ☐ No

41. In what ways can such help/assistance/support be improved? _____

42. What improvement in your most commonly used software packages would you like to see? _____

43. What additional tasks or capabilities would you like your computer system to be able to do? _____

Section 5. Internet Access

If you have internet access go on to question 47

44. In how many years do you expect to connect to the internet?(Tick one box)

- 1) less than one
- 2) one or two
- 3) less than five
- 4) never
- 5) Don't know

☐
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☐

45. What reasons do you have for not connecting to the internet?(Tick one or more boxes)

- 1) Do not have a modem
- 2) Telephone line quality not good enough
- 3) Toll call costs
- 4) Haven't thought about it
- 5) Not interested
- 6) Other (Please specify) _____

☐
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☐
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☐

46. If you have a modem or fax/modem, in which of the following speed ranges does it operate?(Tick one box)

- 1) Less than 2400bps
- 2) Less than 9600bps
- 3) Less than 14400bps
- 4) Less than 28800bps
- 5) 28800bps or greater
- 6) Don't know

☐
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If you do not have internet access that is all the questions we require you to answer. Thank you for taking the time to complete this questionnaire. Please read on if you're interested. Don't forget to use the pre-paid envelope enclosed to return your completed questionnaire.

47. What type of contract do you operate with your internet service provider? (Tick one box)

- 1) Fixed time (eg. 5 hours month at \$12.50 with extra time at \$2.75/hour)
- 2) Time used basis (eg. \$2.50 per hour)

☐
☐

48. How many hours per month do you spend on the internet, and how much does this cost on average per month?

_____ hrs
_____ \$

49. How frequently do you use the internet for each of the following information/functions? (enter 1= never, 2 =occasionally, 3 =frequently)

1) Email

2) News and weather information

3) Market information (including schedule s / prices)

4) Technical information

5) Economic information

6) Updates on changes to agricultural legislation

7) Latest research results

8) Entertainment and fun

9) Ordering equipment and supplies

50. Estimate the hours per month you spend visiting the following sites (Leave blank if no time spent)

MAF

AgResearch

AgriFax

Landcare

Crop and Food Research

Hort Research

NIWA

Meat Board

Dairy Board

WRONZ

Livestock Improvement Corporation

Lincoln University

Massey University

U.S. Department of Agriculture

Australian Bureau of Agriculture

Other (please list)....

and Resource Economics

51. If you **subscribe** to any online information providers (eg. AgriFax) name them and give average hours per month spent visiting the sites.

1) _____

hrs/month _____

2) _____

hrs/month _____

3) _____

hrs/month _____

52. Do you use Email and if so what for? (Tick one or more boxes)

1) Do not use Email but could if wanted to

☐

2) Do not know how to use Email

☐

3) Communicating with friends and family

☐

4) Conducting farm business

☐

53 What kinds of information would you like to have available to you but cannot find on the internet? (*tick one or more boxes*)

- 1) Market and economic information ☐
- 2) Technical data ☐
- 3) Professional services eg. Consultants, Banks, stock agents ☐
- 4) Farm equipment, animal supplies ☐
- 5) Other (*Please specify*) _____ ☐

54. Do you think the internet offers value for money in terms of sourcing up to date information? (*Tick one box*)

- 1) Very valuable ☐
- 2) Valuable ☐
- 3) Neutral or undecided ☐
- 4) Not valuable/ Waste of money ☐
- 5) No opinion ☐

Thank you very much for taking the time to complete and return this questionnaire. The results will be of general interest to many people, including businesses and policy makers while also assisting development of computing solutions for primary production problems. Results will be published in the popular press for all to consider.

Please use the self addressed freepost envelope enclosed to return the questionnaire.

Appendix Two

The Response Pattern

